HOLUX

Quick Installation Guide

GPS Receiver

Car Cradle Mode CR-100

CE

Declaration of Conformity

The following products is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility Directive (89/336/EEC). The listed standard as below were applied:

The following Equipment:

Product	:	CAR CRADLE GPS RECEIVER
Trade Name	:	***HOLUX***
Model Number	:	CR-100

This product is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility Directive (89/336/EEC). For the evaluation regarding EMC, the following standards were applied:

RFI Emission:

EN 55022	: Emission standard
EN 61000-3-2	: Limits for harmonic current emission
EN 61000-3-3	: Limitation of voltage fluctuation and flicker in low-voltage supply system

Immunity:

EN 55024	: Immunity standard

The following importer/manufacturer is responsible for this declaration:

Company Name	: **HOLUX Technology, Inc**		
Company Address	: **1F, No.30, R&D Rd. II, Hsinchu City 300, Taiwan（R.O.C.）**		
Telephone	: 886-3-6687000	Facsimile:	886-3-6687111

Person is responsible for marking this declaration:

Wen Cheng Chung	President
Name (Full Name)	Position/ Title
June-08-2006	Wencheng
Date	Legal Signature

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2. 1077(a)

The following equipment:

Product Name : CAR CRADLE GPS RECEIVER

Trade Name : ***HOLUX***

Model Number : CR-100

Company Name : **HOLUX Technology, Inc**

It's herewith confirmed to comply with the requirements of FCC Part 15 Rules. (Class B)
Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

The result of electromagnetic emission has been evaluated by SGS Taiwan EMC laboratory (NVLAP Lab. Code: 0513) and showed in the test report.
(Report No.: SGS-EM/2004/B0130)

It is understood that each unit marketed is identical to the device as tested, and Any changes to the device that could adversely affect the emission Characteristics will require retest.
The following importer / manufacturer is responsible for this declaration:

Company Name **HOLUX Technology, Inc**

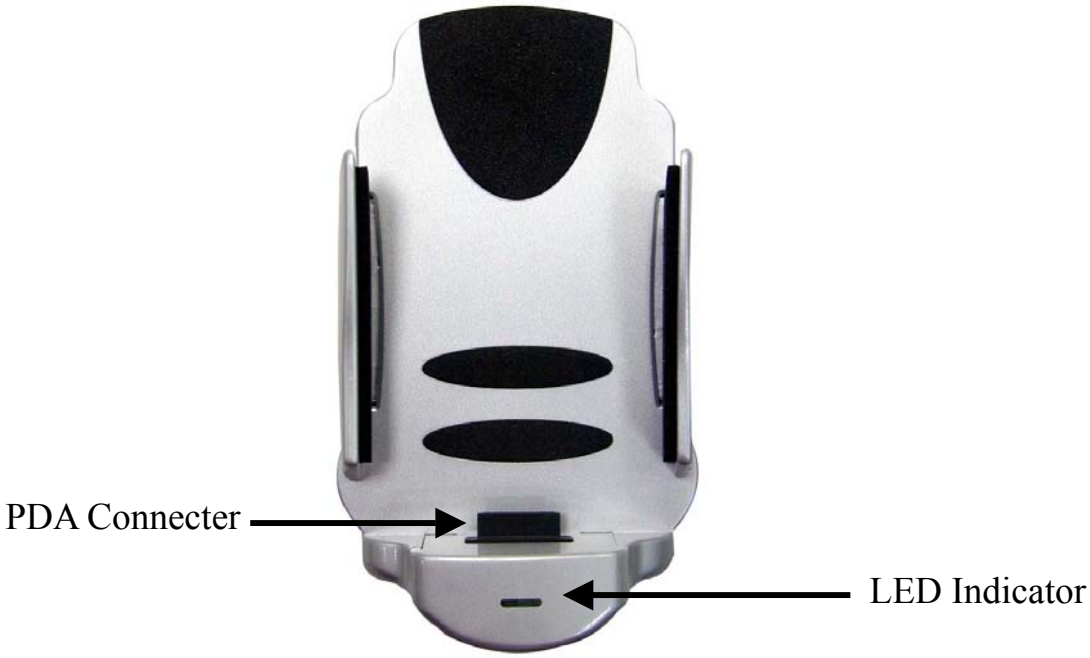
Company Address **1F, No.30, R&D Rd. II, Hsinchu City 300, Taiwan（R.O.C.）**

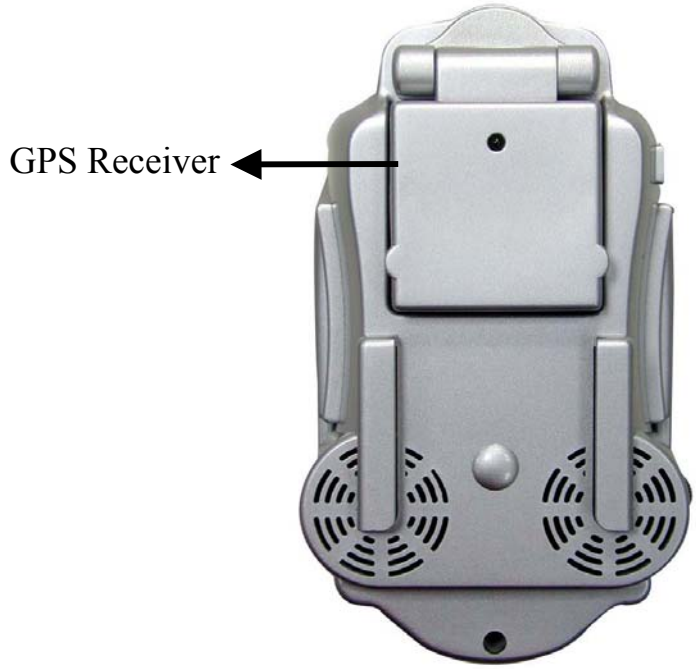
Telephone 886-3-6687000 Facsimile : 886-3-6687111

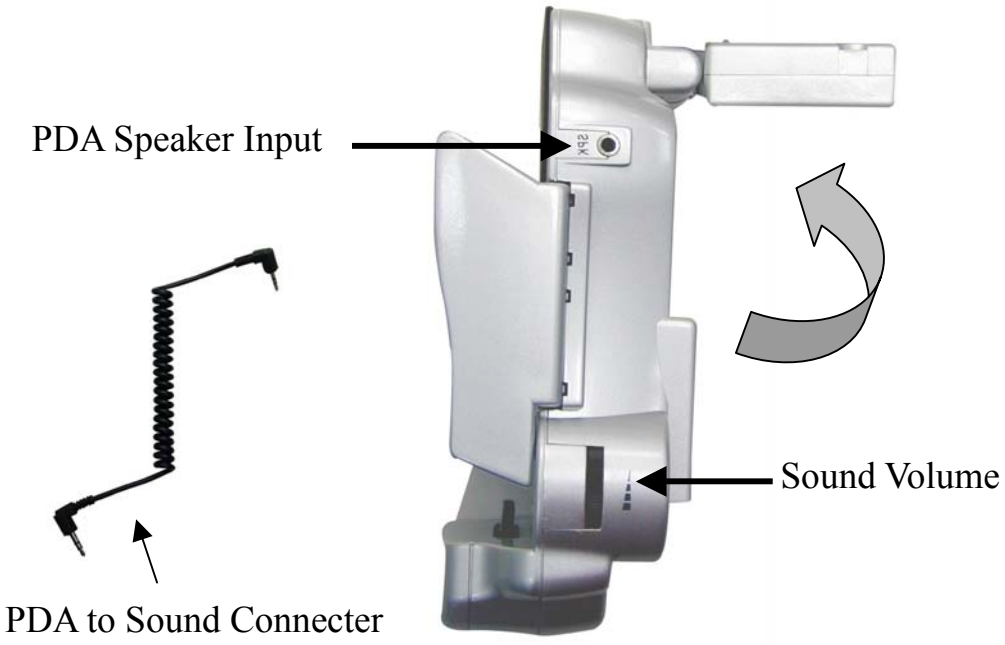
Person is responsible for marking this declaration:

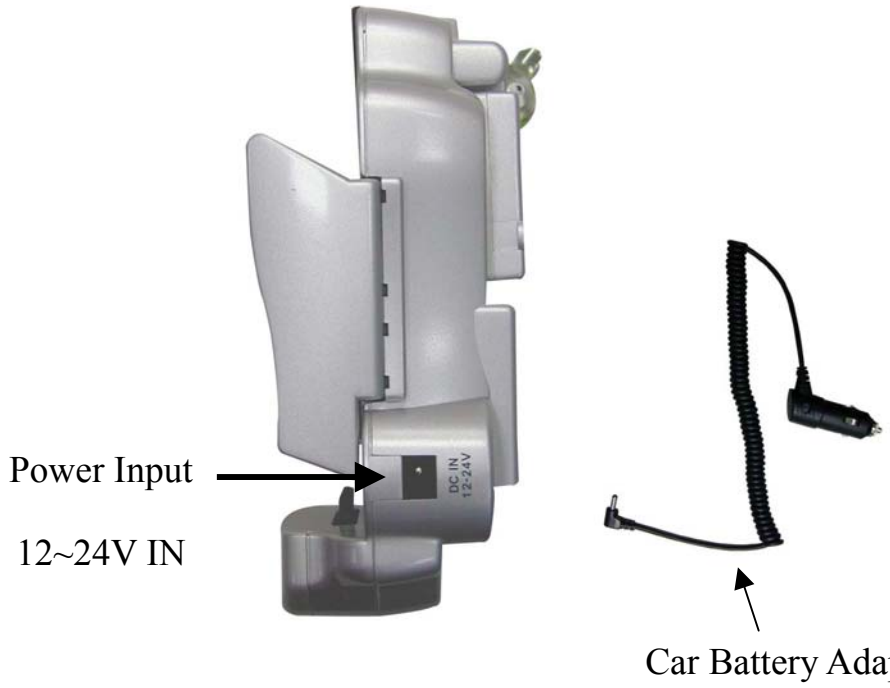
Wen Cheng Chung	President
Name (Full name)	Position / Title
June-08-2006	Wencheng
Date	Legal Signature

0. Components and Installation






PDA Speaker Input
Sound Volume
PDA to Sound Connecter


Power Input
12~24V IN
DC IN
12-24V
Car Battery Adapter

0.1 Choose an appropriate holder model to go with your PDA.

Model	PDA type
CR100-I1	IPAQ 38xx,39xx
CR100-P1	Palm TUNGSTEN T3
CR100-D1	Dell X3
CR100-M1	Mio 528
CR100-I2	IPAQ 2210

0.2 Pull the arms of a clamp out from both sides of the holder and gently place your PDA on the base of the holder. Make sure that the socket of your PDA is connected properly to the PDA connector of the holder for the installation.

0.3 Connect one end of the audio cable to the sound connector of your PDA and the other end to the Holder SPK IN connector of the holder.

0.4 Insert one end of the car battery adapter into the cigarette lighter socket of your car. After the power is connected, both of the LED indicator (Green Light) of the base and the LED indicator (Orange Light) of the GPS are lit simultaneously, which stands for having a normal power supply.

0.5 Adjust the position of the GPS antenna to the best receiving position (with the antenna facing the sky), and the holder will automatically adjust its position according to the receiving conditions and output data to the PDA. After the GPS receiver completes its 3D positioning, the green LED indicator will blink once every second.

1. Function

1. The GPS antenna of the built-in GPS receiver can be rotated 90^0C to enhance the sensitivity of receiving signals.

2. This product adopts the SiRF II high-performance power saving chip to greatly reduce the size and easily integrate with the customer's application programs.

3. With the requirements for quick fixing position and power saving, this product still possesses the highly sensitive receiving capability for tracking 12 satellites.

4. The built-in clock and memory accompanied with the rechargeable battery maintain the most updated information all the time. The rechargeable battery is charged when this product is in normal use.

5. This product is provided with the power for charging the PDA and operating the GPS simultaneously.

6. It is not necessary for users to set the configuration for the first time use of the product.

7. Two-way communication channel and selectable baud rate allow users to maximize the interface capability and have better flexibility.

8. Users can amplify the output of the PDA audio frequency and control the sound volume.

9. This product comes with 2 sets of LEDs for indicating the status of power supply and fixing position.

2. Electric Parameters of the Holder

1. Input voltage： DC: 12V~24V
2. Output voltage and current:

Output	Output Current Range		Output Voltage Range	
	Min	Max	Min	Max
DC +5V	0.0A	2A	DC 4.75V	DC 5.25V

3. The operating efficiency is over 60%.
4. Short Circuit Protection
   If the anode or cathode of the output end of a car PDA holder is short circuited, the car PDA holder may be destructed or damaged. It is necessary to keep a normal holder all the time, since the car PDA holder has to operate properly as soon as the short circuit is fixed.
5. Noise
   The test of this product held in a soundproof room shows that the noise is less than 20dB when the product is 10 cm from the battery charger.
6. LED Indicator
   There are two LED indicators
   (1) A green LED indicator is built at the front end of the holder and turns on to indicate an input of power supply.
   (2) An orange LED indicator is built on the panel of the satellite antenna and turns on to indicate an input of power supply. The LED indicator blinks once every second after the 3D fixing position is located.
7. Operating temperature range: -10℃ ~ +60℃
8. Storage temperature range: -20℃ ~ +80℃
9. Charging temperature range: +0℃ ~ +45℃

3. Mechanical Performance of the Holder

1. We can assure the reliability of the contact of every interface on the PDA holder after performing a plug-and-unplug test for 3000 times.
2. The cigarette lighter socket is a universal type that can meet the requirements for the European, American and Japanese specifications.
3. After each model of PDA is installed onto the PDA holder, the PDA will not fall out when the PDA holder is upside down.

4. Reliability

4.1 High Temperature Test

Place the CR-100 in an environment at 55^{O}C for 48 hours, and then place it in an environment at room temperature for 1 hour after charging a battery. The CR-100 should be able to work properly after this test.

4.2 Low Temperature Test

Place the CR-100 in an environment at -20^{O}C for 48 hours, and then place it in an environment at room temperature for 1 hour after charging a battery. The CR-100 should be able to work properly after this test.

4.3 Cold/Hot Impact Test

Place the CR-100 in an environment at 55^{O}C for 24 hours, and then remove it and immediately place it in a cold environment at -20^{O}C for 24 hours. The CR-100 should be able to work properly after performing this test for 12 times.

4.4 Constant Humidity/Temperature Test

Place the CR-100 in an environment at the temperature of 40^{O}C$\pm$2^{O}C and the ambient humidity of 90%～95%RH for 96 hours, and then place it an environment at room temperature for 1 hour. The CR-100 should be able to work properly after the test.

5 *GPS Receiver* Technical Specifications

5.1 Tracks up to 12 satellites。

5.2 Update rate: 1 second.

5.3 Acquisition time (Average)

Reacquisition：0.1 sec.

Hot start：8 sec.

Warm start：38 sec.

Cold start：45 sec

5.4 Accuracy (Open Sky)

1). Position：10 meters, 2D RMS。

2). 7 meters 2D RMS, WAAS corrected。

3). 1-5 meters, DGPS corrected。

4). Altitude ：< ± 35m Vertical in term of 95%。

5). Velocity：0.1 meters/second。

6). Time 1 microsecond synchronized to GPS time。

5.5 Dynamic Conditions

1). Altitude : 18,000 meters (60,000 feet)max。
2). Velocity：515 meters/second (1000 knots) max。
3). Acceleration：4g, max。
4). Jerk：20 meters/second, max。

5.6. Output interface

1) Output protocol: Baud Rate 4800 bps, N.8.1
2) NMEA 0183 Version 2.2 ASCII output (GGA, GSA, GSV, RMC (VTG , GLL and ZDA for optional))。

6.1 Initialization

As soon as the initial self-test ends, the CR-100 automatically starts the satellite acquisition and tracking. It normally takes approximately 45 seconds to obtain a position fix and about 38 seconds if the ephemeris data is known. After the position fix is calculated, the information about valid position, velocity and time will be transmitted to the output channel.

The CR-100 utilizes the initial data such as last stored position, date, time and satellite orbital data to maximize acquisition performance. If there exists a significant inaccuracy of the initial data, or an obsolete orbital data, it may take more time to obtain a navigation solution. The CR-100 Auto-locate feature can automatically determine a navigation solution without any intervention from the host system. However, the acquisition performance of the CR-100 can be improved for initializing the host system in the following situations:

1) Moving farther than 500 kilometers.
2) Failure of data storage due to an inactive internal memory battery.

6.2 Navigation & Software interface

After the acquisition process is complete, the CR-100 sends valid navigation information over output channels. These data include:

1. Latitude/longitude/altitude
2. Velocity
3. Date/time
4. Error estimates
5. Satellite and receiver status

Software interface.

The CR-100 interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCⅡ interface specification, which is defined in NMEA 0183, Version 2.2 and the Radio Technical Commission for Maritime Services (RTCM Recommended Standards For Differential Navstar GPS Service, Version 2.1, RTCM Special Committee No.104).

6.3 NMEA Transmitted Messages

CR-100 is smart GPS receiver base on SiRF technology. The default communication parameters for NMEA output are 4800 baud, 8 data bits, 1 stop bit, and no parity.

Table 6-1 NMEA-0183 Output Messages

NMEA Record	**Description**
GPGGA	Global positioning system fixed data
GPGLL	Geographic position- latitude/longitude
GPGSA	GNSS DOP and active satellites
GPGSV	GNSS satellites in view
GPRMC	Recommended minimum specific GNSS data
GPVTG	Course over ground and ground speed
GPMSS	Radio-beacon Signal-to-noise ratio, signal strength, frequency, etc.
GPZDA	PPS timing message (synchronized to PPS)

6.3.1 Global Positioning System Fix Data (GGA)

Table 6-2 contains the values for the following example:

$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M, , , ,0000*18

Table 6-2 GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 6-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude (1)	9.0	Meters	
Units	M	Meters	
Geoid Separation(1)		Meters	
Units	M	Meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

(1). SiRF Technology Inc. does not support geoid corrections. Values are WGS84 ellipsoid heights.

Table 6-3 Position Fix Indicator

Value	Description
0	0 Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

6.3.2 Geographic Position with Latitude/Longitude(GLL)

Table 6-4 contains the values for the following example:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C

Table 6-4 GLL Data Format

Name	Example	Units	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N/S Indicator N N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Checksum	*2C		
<CR> <LF>			End of message termination

6.3.3 GNSS DOP and Active Satellites (GSA)

Table 6-5 contains the values for the following example:

$GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33

Table 6-5 GSA Data Format

Name	Example	Units	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 6-6
Mode 2	3		See Table 6-7
Satellite Used(1)	07		Sv on Channel 1
Satellite Used(1)	02		Sv on Channel 2
……			….
Satellite Used(1)			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		

<CR> <LF>			End of message termination

1. Satellite used in solution.

Table 6-6 Mode 1

Value	Description
M	Manual—forced to operate in 2D or 3D mode
A	2DAutomatic—allowed to automatically switch 2D/3D

Table 6-7 Mode 2

Value	Description
1	Fix Not Available
2	2D
3	3D

6.3.4 GNSS Satellites in View (GSV)

Table 6-8 contains the values for the following example:

$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42*71
$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42*41

Table 6-8 GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages(1)	2		Range 1 to 3
Message Number(1)	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
....	....		
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)

Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination

(1). Depending on the number of satellites tracked multiple messages of GSV data may be required.

6.3.5 Recommended Minimum Specific GNSS Data (RMC)

Table 6-9 contains the values for the following example:

$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598, ,*10

Table 6-9 RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation(1)		degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination

(1). SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.

6.3.6 Course Over Ground and Ground Speed (VTG)

Table 6-10 contains the values for the following example:

$GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

Table 6-10 VTG Data Format

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic(1)
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Checksum	*6E		
<CR> <LF>			End of message termination

(1). SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.

7. Order Information

Model	PDA type	Built-in GPS function
CR100-I1	IPAQ 38xx,39xx	YES
CR100-P1	Palm TUNGSTEN T3	YES
CR100-D1	Dell X3	YES
CR100-M1	Mio 528	YES
CR100-I2	IPAQ 2210	YES

8.Warranty

The CR-100 is warranted to be free from defects in material and functions for one year from the date of purchase. Any failure of this product within this period under normal conditions will be replaced at no charge to the customers.

FCC Notice

FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/ TV technician for help.

CAUTION:
Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.